FIG. 1

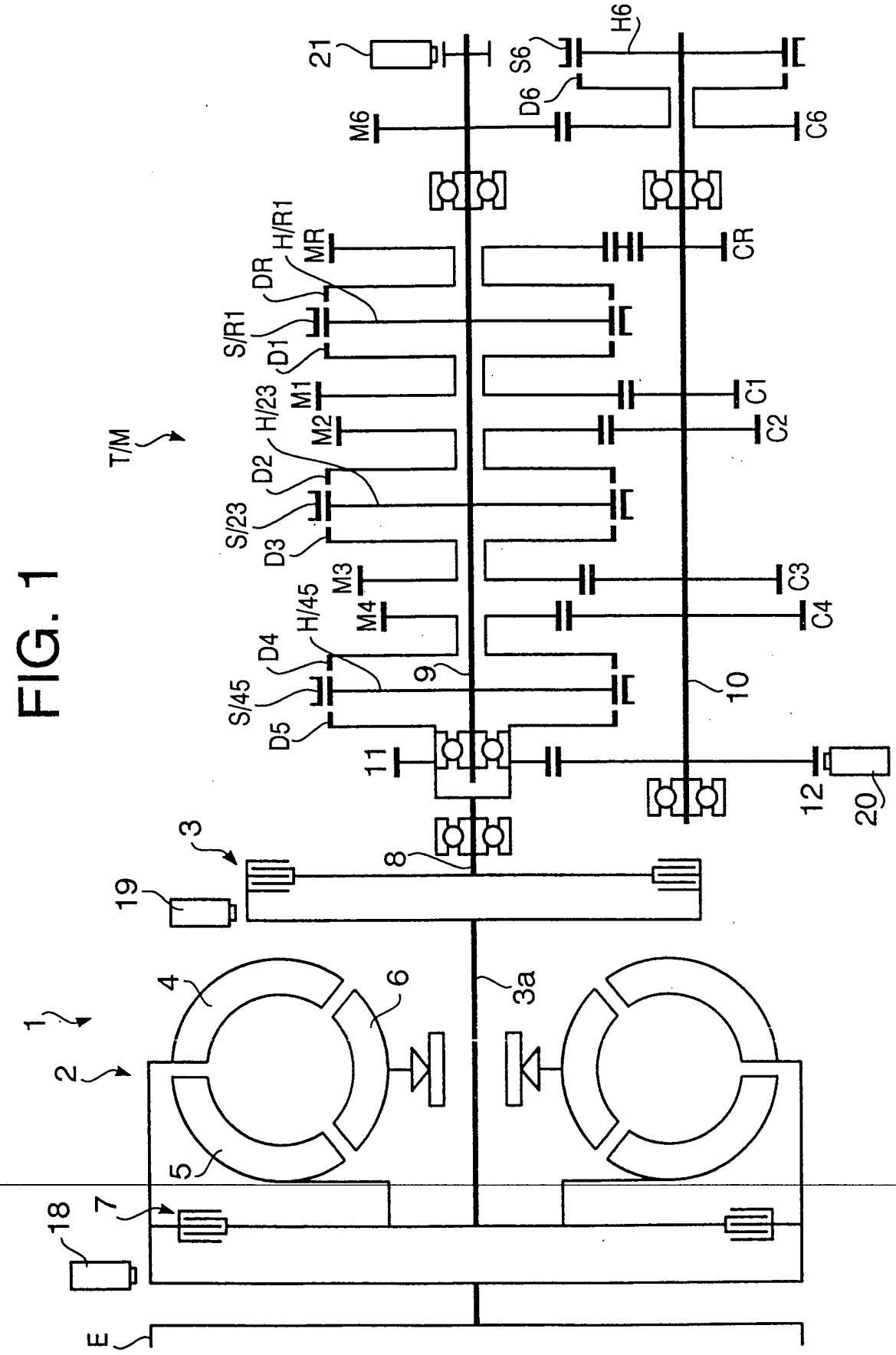

T/M
1
2
3
3a
4
5
6
7
8
9
10
11
12
18
19
20
21
E
H6
S6
D6
M6
C6
H/R1
MR
DR
CR
S/R1
D1
M1
C1
H/23
M2
C2
D2
S/23
D3
M3
C3
H/45
M4
C4
D4
S/45
D5

FIG. 2

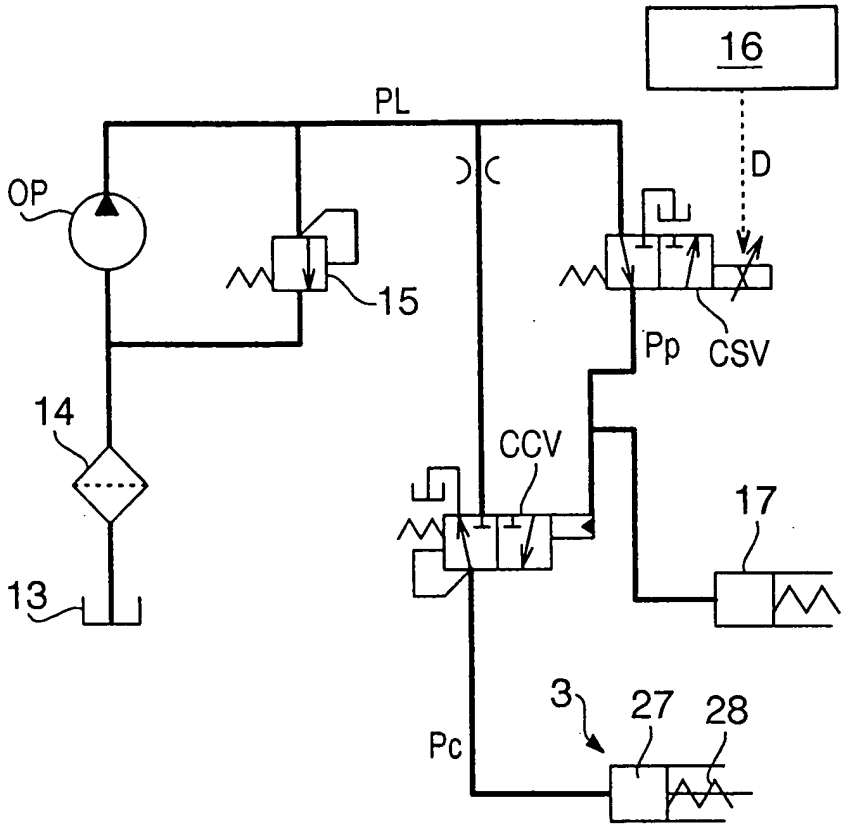

16
PL
D
OP
15
Pp
CSV
14
CCV
17
13
3
27
28
Pc

FIG. 3

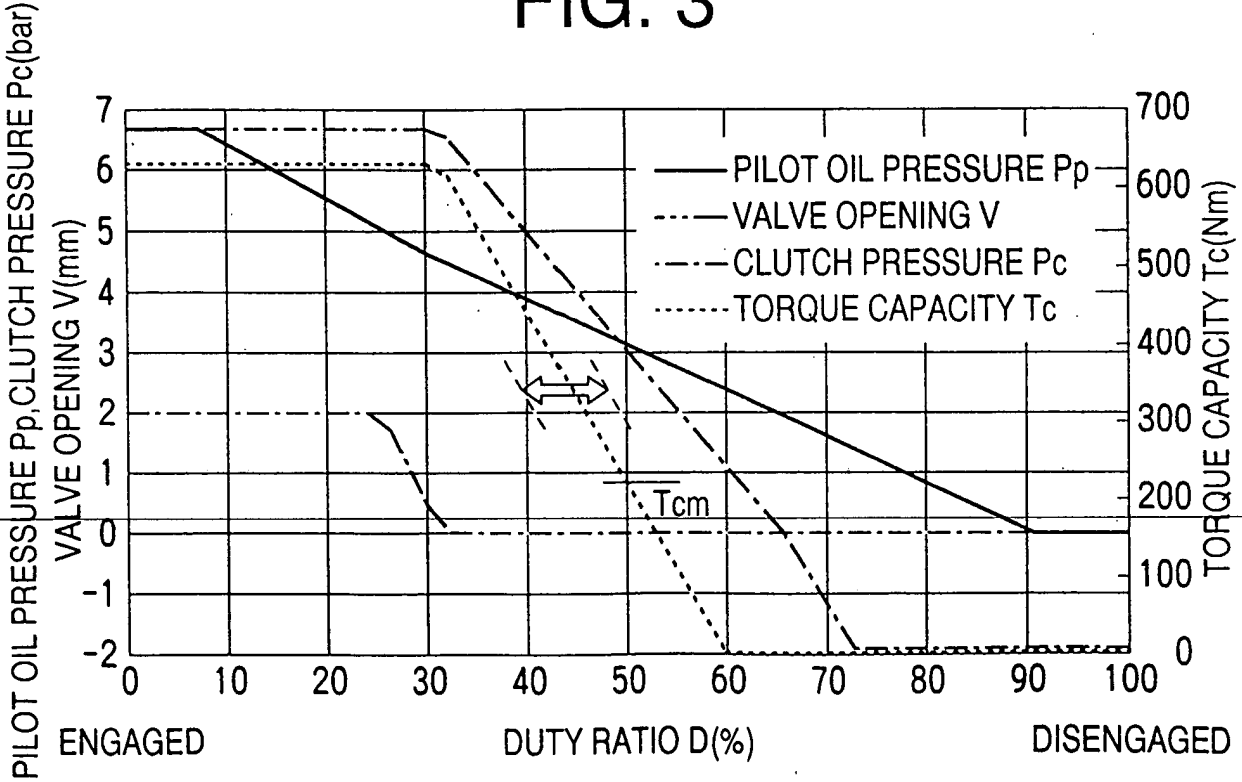
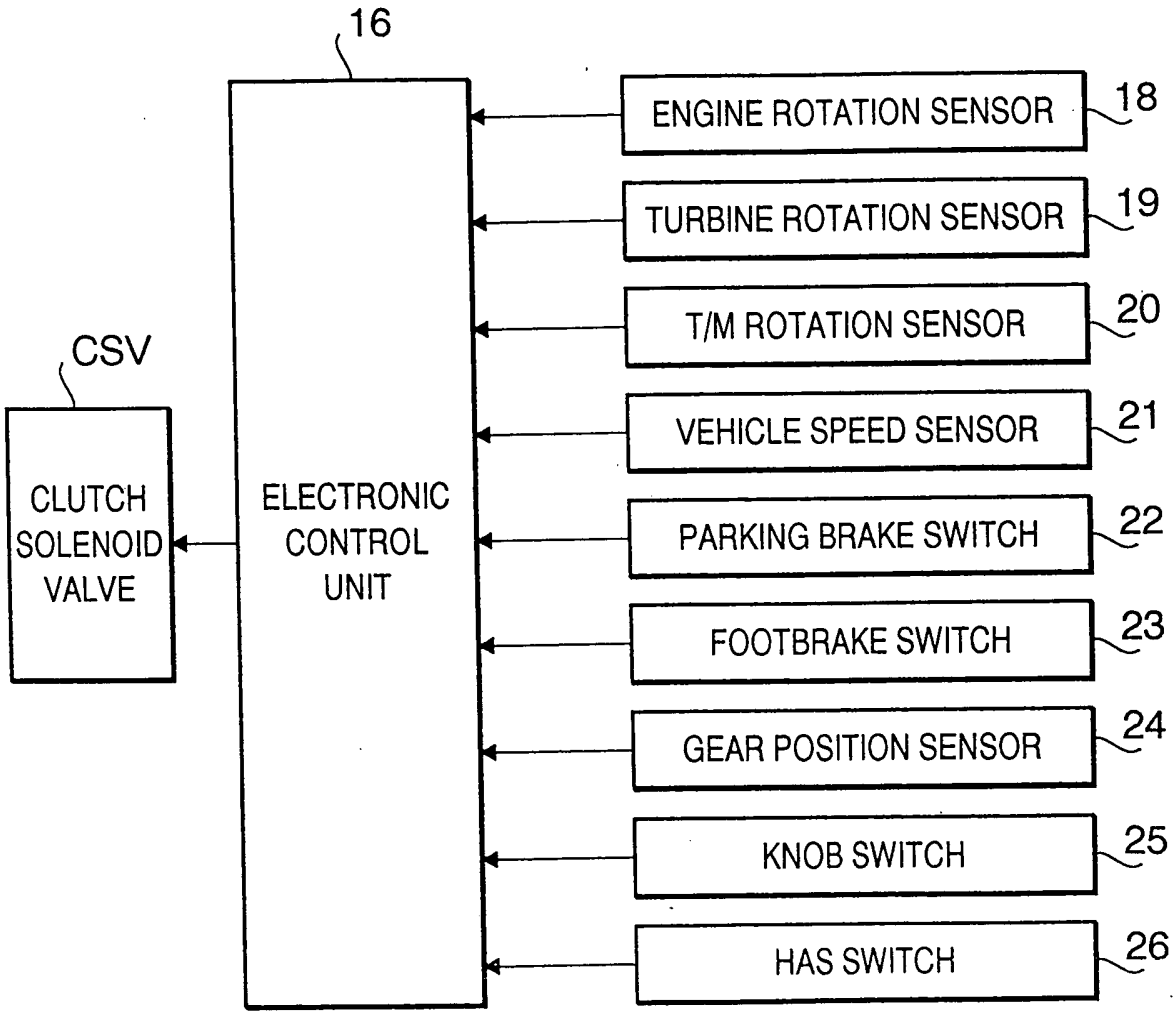

PILOT OIL PRESSURE Pp,CLUTCH PRESSURE Pc(bar)
VALVE OPENING V(mm)
TORQUE CAPACITY Tc(Nm)
PILOT OIL PRESSURE Pp
VALVE OPENING V
CLUTCH PRESSURE Pc
TORQUE CAPACITY Tc
Tcm
ENGAGED
DUTY RATIO D(%)
DISENGAGED

FIG.4


16
ELECTRONIC CONTROL UNIT
CSV
CLUTCH SOLENOID VALVE
ENGINE ROTATION SENSOR
18
TURBINE ROTATION SENSOR
19
T/M ROTATION SENSOR
20
VEHICLE SPEED SENSOR
21
PARKING BRAKE SWITCH
22
FOOTBRAKE SWITCH
23
GEAR POSITION SENSOR
24
KNOB SWITCH
25
HAS SWITCH
26

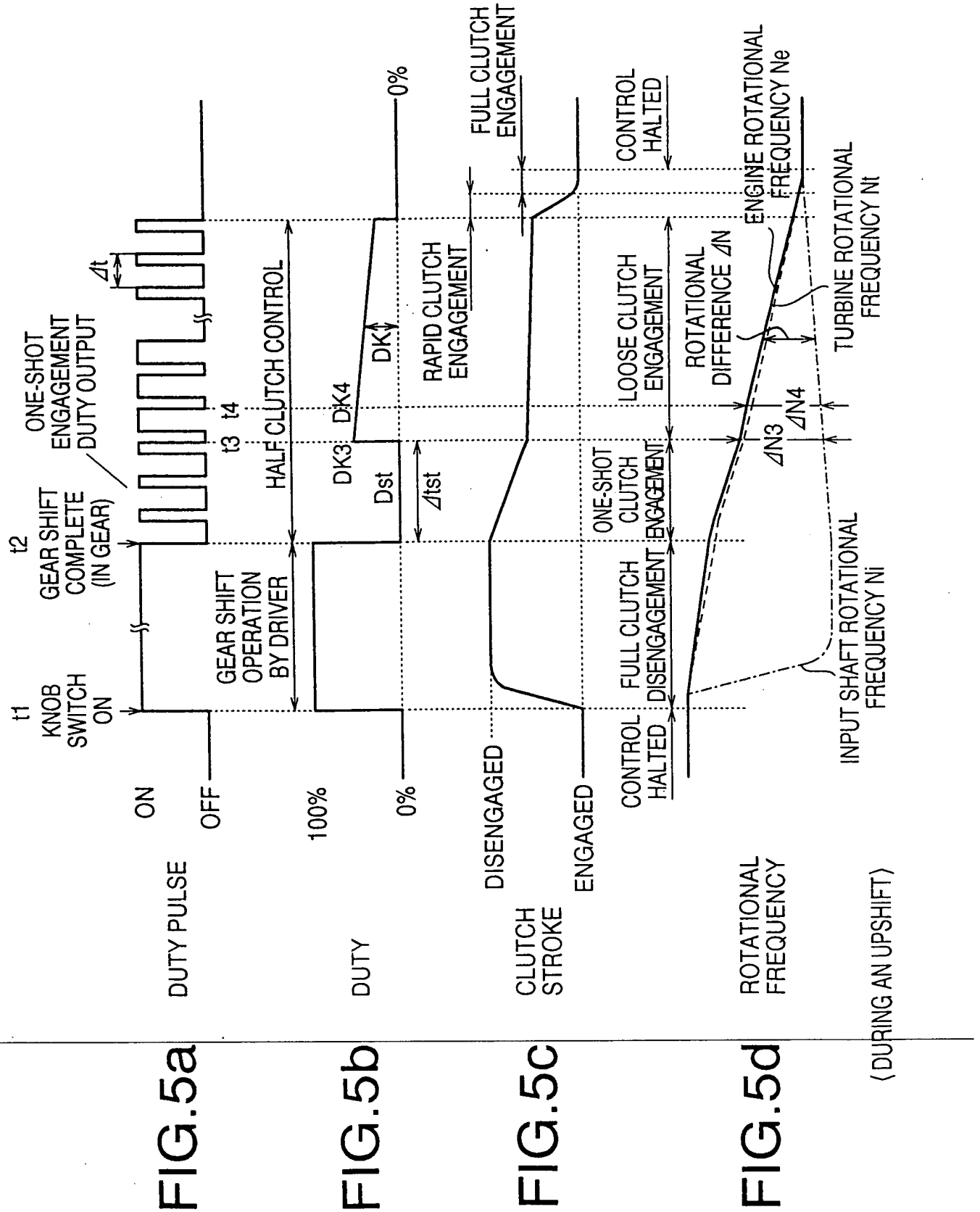



FIG.5a

FIG.5b

FIG.5c

FIG.5d

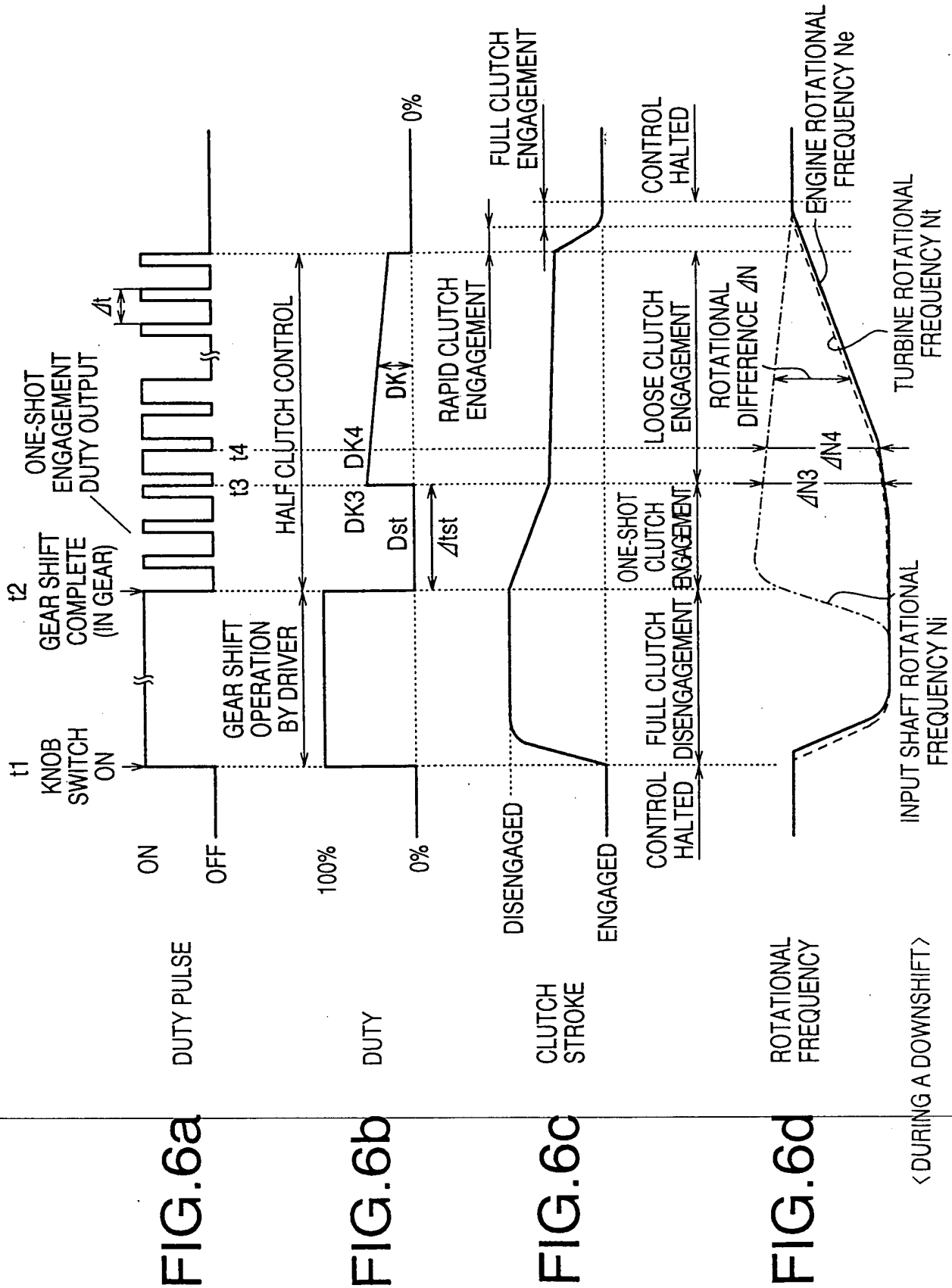



FIG.6a

FIG.6b

FIG.6c

FIG.6d

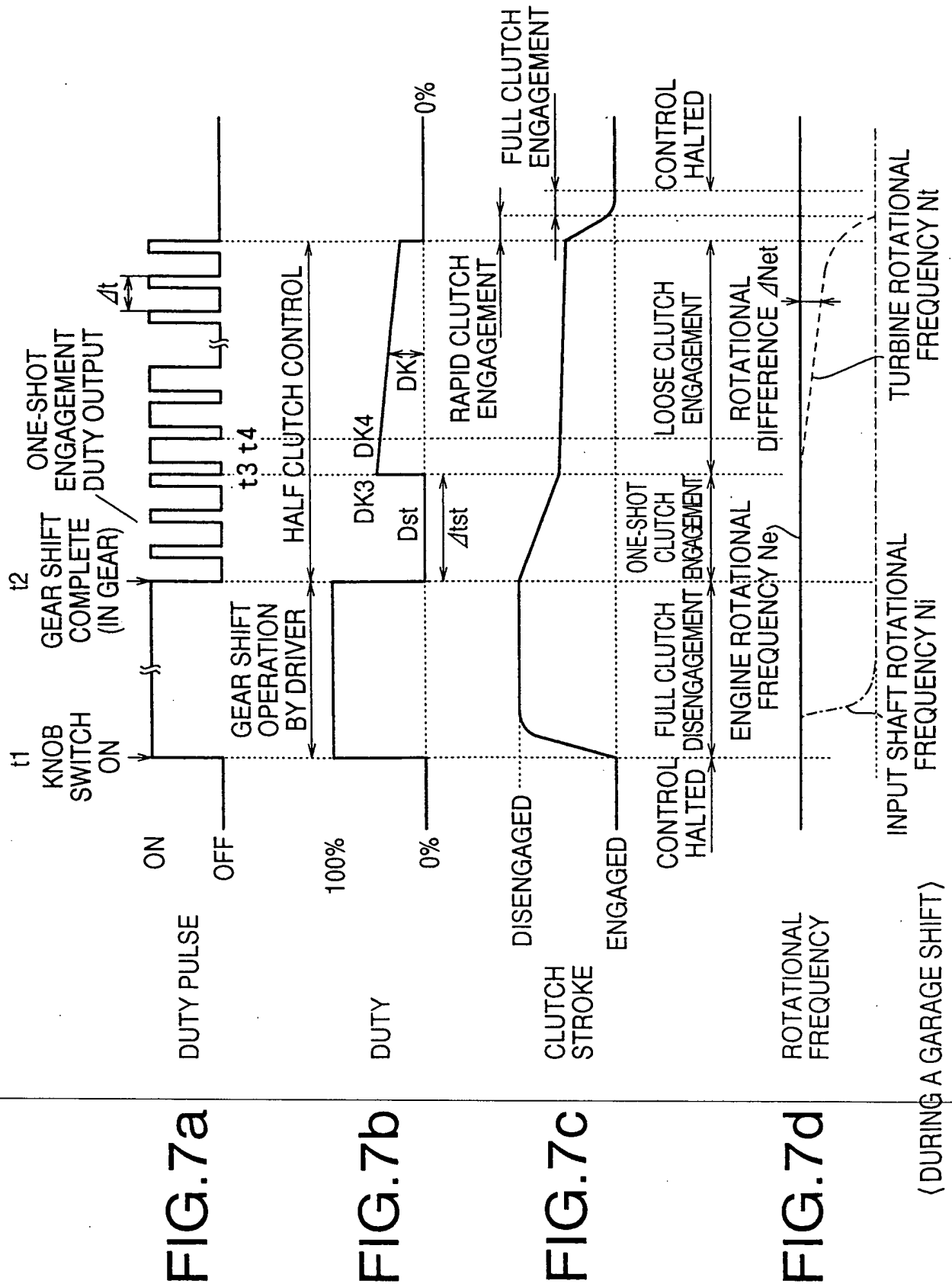



FIG.7a

FIG.7b

FIG.7c

FIG.7d

# FIG. 8

ΔN

GEAR STAGE

| Ds | 160rpm | 320rpm | 480rpm | 640rpm | 800rpm | 960rpm | 1120rpm | 1280rpm |
|---|---|---|---|---|---|---|---|---|
| R GEAR | 0005(H) | 0030(H) | 0040(H) | 0050(H) | 0060(H) | 0070(H) | 0080(H) | 0090(H) |
| 1st SPEED | 0005(H) | 0030(H) | 0030(H) | 0030(H) | 0040(H) | 0040(H) | 0040(H) | 0050(H) |
| 2nd SPEED | 0005(H) | 0030(H) | 0030(H) | 0030(H) | 0040(H) | 0040(H) | 0040(H) | 0050(H) |
| 3rd SPEED | 0005(H) | 0050(H) | 0060(H) | 0070(H) | 0080(H) | 0090(H) | 00A0(H) | 00B0(H) |
| 4th SPEED | 0100(H) | 0100(H) | 0100(H) | 0100(H) | 0100(H) | 0200(H) | 0300(H) | 0400(H) |
| 5th SPEED | 0100(H) | 0100(H) | 0100(H) | 0100(H) | 0100(H) | 0200(H) | 0300(H) | 0400(H) |
| 6th SPEED | 0100(H) | 0100(H) | 0100(H) | 0100(H) | 0100(H) | 0200(H) | 0300(H) | 0400(H) |

<DURING AN UPSHIFT>

# FIG. 9

ΔN

GEAR STAGE

| Ds | 160rpm | 320rpm | 480rpm | 640rpm | 800rpm | 960rpm | 1120rpm | 1280rpm |
|---|---|---|---|---|---|---|---|---|
| R GEAR | 0005(H) | 0008(H) | 0008(H) | 0008(H) | 0010(H) | 0020(H) | 0030(H) | 0030(H) |
| 1st SPEED | 0005(H) | 0005(H) | 0008(H) | 0008(H) | 0010(H) | 0020(H) | 0030(H) | 0030(H) |
| 2nd SPEED | 0005(H) | 0005(H) | 0008(H) | 0008(H) | 0010(H) | 0020(H) | 0030(H) | 0030(H) |
| 3rd SPEED | 0005(H) | 0005(H) | 0010(H) | 0010(H) | 0020(H) | 0030(H) | 0040(H) | 0050(H) |
| 4th SPEED | 0005(H) | 0800(H) | 0100(H) | 0200(H) | 0100(H) | 0100(H) | 0080(H) | 0080(H) |
| 5th SPEED | 0100(H) | 0200(H) | 0200(H) | 0200(H) | 0100(H) | 0100(H) | 0080(H) | 0080(H) |
| 6th SPEED | 0100(H) | 0200(H) | 0200(H) | 0200(H) | 0100(H) | 0100(H) | 0080(H) | 0080(H) |

<DURING A DOWNSHIFT>

FIG.10

ΔN

GEAR STAGE

| Ds | 0rpm | 40rpm | 80rpm | 120rpm | 160rpm | 200rpm | 240rpm | 280rpm |
|---|---|---|---|---|---|---|---|---|
| R GEAR | 0040(H) | 0030(H) | 0020(H) | 0010(H) | 0010(H) | 0010(H) | 00A0(H) | 0000(H) |
| 1st SPEED | 0040(H) | 0030(H) | 0020(H) | 0010(H) | 0010(H) | 0010(H) | 00A0(H) | 0000(H) |
| 2nd SPEED | 0040(H) | 0030(H) | 0020(H) | 0010(H) | 0010(H) | 0010(H) | 00A0(H) | 0000(H) |
| 3rd SPEED | 0040(H) | 0030(H) | 0020(H) | 0010(H) | 0010(H) | 0010(H) | 00A0(H) | 0000(H) |
| 4th SPEED | 0040(H) | 0030(H) | 0020(H) | 0010(H) | 0010(H) | 0010(H) | 00A0(H) | 0000(H) |
| 5th SPEED | 0040(H) | 0030(H) | 0020(H) | 0010(H) | 0010(H) | 0010(H) | 00A0(H) | 0000(H) |
| 6th SPEED | 0040(H) | 0030(H) | 0020(H) | 0010(H) | 0010(H) | 0010(H) | 00A0(H) | 0000(H) |

<DURING A GARAGE SHIFT>

FIG.11

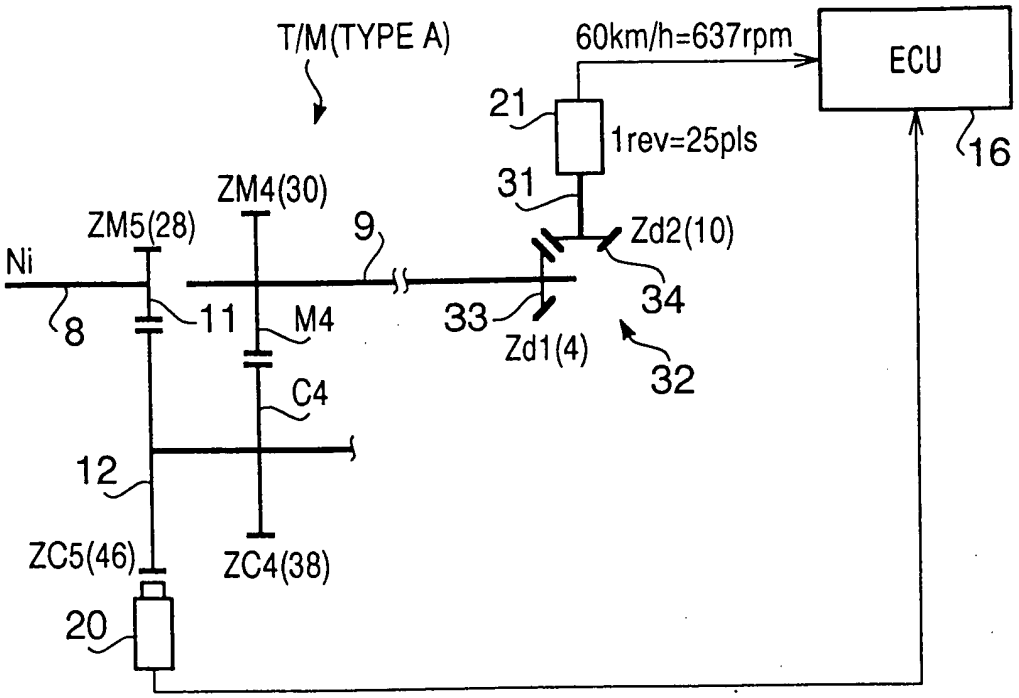

T/M(TYPE A)
60km/h=637rpm
ECU
16
21
1rev=25pls
31
Zd2(10)
34
ZM4(30)
9
ZM5(28)
Ni
8
11
M4
33
Zd1(4)
32
C4
12
ZC5(46)
ZC4(38)
20

FIG.12

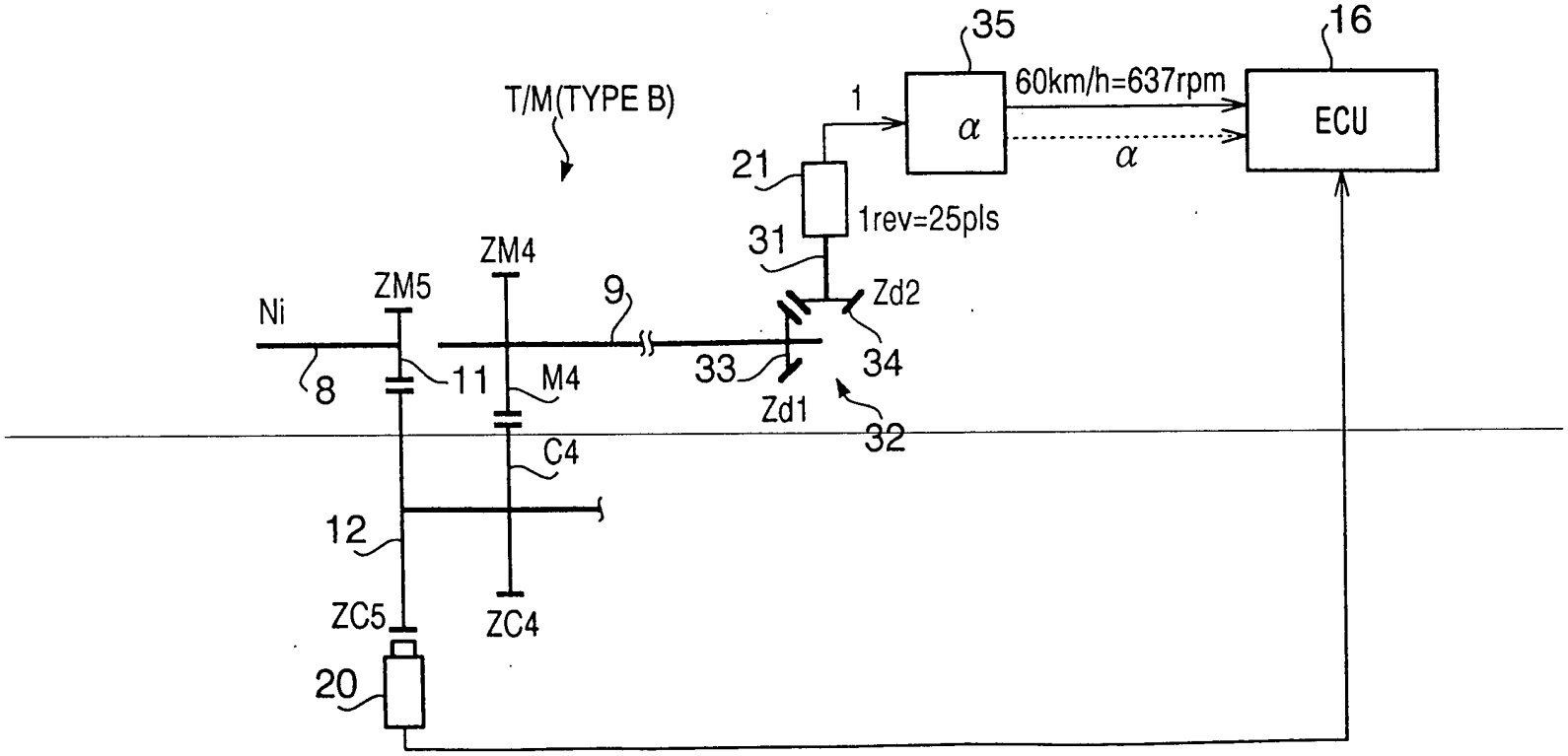

35
16
T/M(TYPE B)
1
α
60km/h=637rpm
ECU
α
21
1rev=25pls
31
ZM4
ZM5
9
Zd2
Ni
34
8
11
M4
33
Zd1
32
C4
12
ZC5
ZC4
20

FIG.13a

| GEAR STAGE | GEAR RATIO (REDUCTION GEAR RATIO)GR | (Nd) |
|---|---|---|
| Rev | 5.068 | 69.0 |
| 1st | 5.315 | 69.0 |
| 2nd | 2.908 | 69.0 |
| 3rd | 1.558 | 69.0 |
| 4th | 1.000 | 70.0 |
| 5th | 0.721 | 69.0 |

FIG.13b

| PTM |
|---|
| 354.0 |
| 372.0 |
| 203.0 |
| 109.0 |
| 70.0 |
| 50.0 |

FIG.14

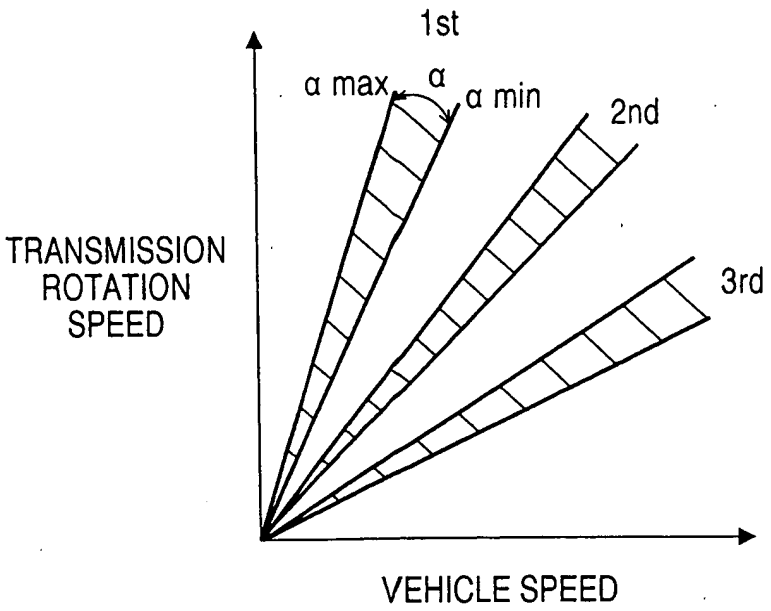

1st
α max
α
α min
2nd
3rd
TRANSMISSION ROTATION SPEED
VEHICLE SPEED

FIG.15

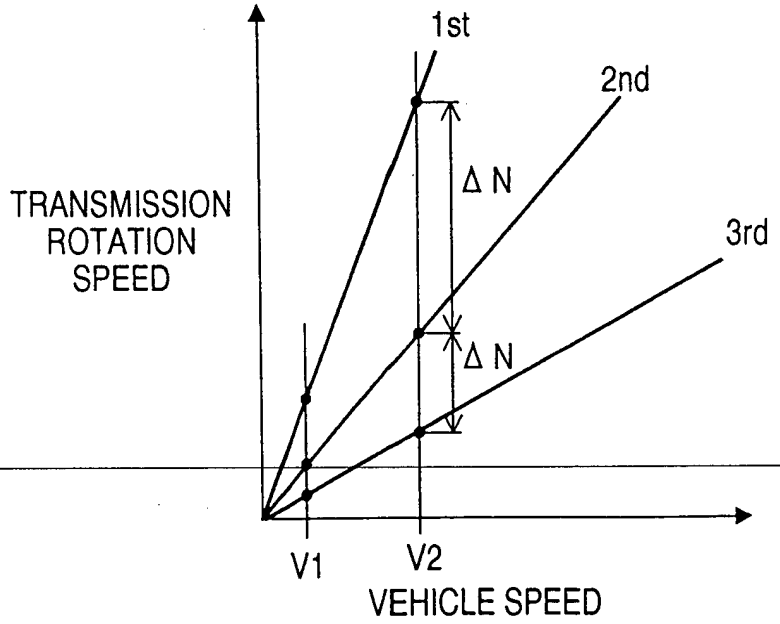
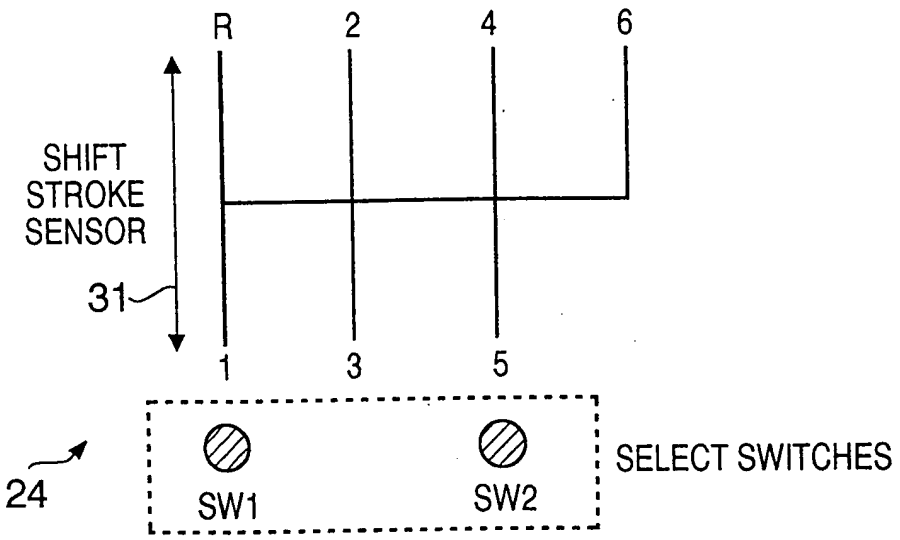

1st
2nd
3rd
Δ N
Δ N
TRANSMISSION ROTATION SPEED
V1
V2
VEHICLE SPEED

FIG.16



# FIG.17

| | | | NUMBER OF TEETH OF DRIVEN GEAR | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GEAR STAGE | REDUCTION GEAR RATIO | | 10 | | 11 | | 12 | | 13 | | ••• | 17 | | |
| | | | PTM | Nd | PTM | Nd | PTM | Nd | PTM | Nd | ••• | PTM | Nd | |
| Rev | 5.701 | | 394.0 | 69.0 | 434.0 | 76.0 | 474.0 | 83.0 | 514.0 | 90.0 | ••• | 668.0 | 117.0 | |
| 1st | 5.979 | | 413.0 | 69.0 | 455.0 | 76.0 | 497.0 | 83.0 | 539.0 | 90.0 | ••• | 706.0 | 118.0 | |
| 2nd | 3.434 | | 237.0 | 69.0 | 261.0 | 76.0 | 286.0 | 83.0 | 310.0 | 90.0 | ••• | 406.0 | 118.0 | |
| 3rd | 1.862 | | 129.0 | 69.0 | 142.0 | 76.0 | 155.0 | 83.0 | 168.0 | 90.0 | ••• | 220.0 | 118.0 | |
| 4th | 1.297 | | 90.0 | 69.0 | 99.0 | 76.0 | 108.0 | 83.0 | 117.0 | 90.0 | ••• | 154.0 | 118.0 | |
| 5th | 1.000 | | 70.0 | 70.0 | 76.0 | 76.0 | 84.0 | 84.0 | 90.0 | 90.0 | ••• | 118.0 | 118.0 | |
| 6th | 0.774 | | 54.0 | 69.0 | 59.0 | 76.0 | 65.0 | 83.0 | 70.0 | 90.0 | ••• | 92.0 | 118.0 | |
| FAIL | Rev | 2nd | 394.0 | 114.0 | 434.0 | 126.0 | 474.0 | 138.0 | 514.0 | 149.0 | ••• | 668.0 | 194.0 | |
| | 1ST | 3rd | 413.0 | 221.0 | 455.0 | 244.0 | 497.0 | 266.0 | 539.0 | 289.0 | ••• | 706.0 | 379.0 | |
| | 4TH | 2nd | 90.0 | 26.0 | 99.0 | 28.0 | 108.0 | 31.0 | 117.0 | 34.0 | ••• | 154.0 | 44.0 | |
| | 5TH | 3rd | 70.0 | 37.0 | 76.0 | 40.0 | 84.0 | 45.0 | 90.0 | 48.0 | ••• | 118.0 | 63.0 | |
| | 6TH | 2nd | 54.0 | 15.0 | 59.0 | 17.0 | 65.0 | 18.0 | 70.0 | 20.0 | ••• | 92.0 | 26.0 | |

Attorney Docket Number: 5616-74

# FIG.18

| GEAR STAGE | REDUCTION GEAR RATIO | | NUMBER OF TEETH OF DRIVEN GEAR | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10 | | 11 | | 12 | | 13 | | ••• | | 17 | |
| | | | PTM | Nd | PTM | Nd | PTM | Nd | PTM | Nd | ••• | | PTM | Nd |
| Rev | 5.068 | | 354.0 | 69.0 | 390.0 | 76.0 | 425.0 | 83.0 | 461.0 | 90.0 | ••• | | 632.0 | 117.0 |
| 1st | 5.315 | | 372.0 | 69.0 | 409.0 | 76.0 | 446.0 | 83.0 | 483.0 | 90.0 | ••• | | 632.0 | 118.0 |
| 2nd | 2.908 | | 203.0 | 69.0 | 223.0 | 76.0 | 244.0 | 83.0 | 264.0 | 90.0 | ••• | | 346.0 | 118.0 |
| 3rd | 1.558 | | 109.0 | 69.0 | 119.0 | 76.0 | 130.0 | 83.0 | 141.0 | 90.0 | ••• | | 185.0 | 118.0 |
| 4th | 1.000 | | 70.0 | 70.0 | 77.0 | 77.0 | 84.0 | 84.0 | 91.0 | 91.0 | ••• | | 119.0 | 118.0 |
| 5th | 0.721 | | 50.0 | 69.0 | 76.0 | 76.0 | 60.0 | 83.0 | 65.0 | 90.0 | ••• | | 85.0 | 118.0 |
| 6th | | | | | | | | | | | ••• | | | |
| FAIL | Rev | 2nd | 354.0 | 121.0 | 390.0 | 134.0 | 425.0 | 146.0 | 461.0 | 158.0 | ••• | | 603.0 | 207.0 |
| | 1ST | 3rd | 372.0 | 238.0 | 409.0 | 255.0 | 446.0 | 255.0 | 483.0 | 255.0 | ••• | | 632.0 | 255.0 |
| | 4TH | 2nd | 70.0 | 24.0 | 77.0 | 26.0 | 84.0 | 28.0 | 91.0 | 31.0 | ••• | | 119.0 | 40.0 |
| | 5TH | 3rd | 50.0 | 32.0 | 55.0 | 35.0 | 60.0 | 38.0 | 65.0 | 41.0 | ••• | | 85.0 | 54.0 |

Attorney Docket Number: 5616-74

FIG.19

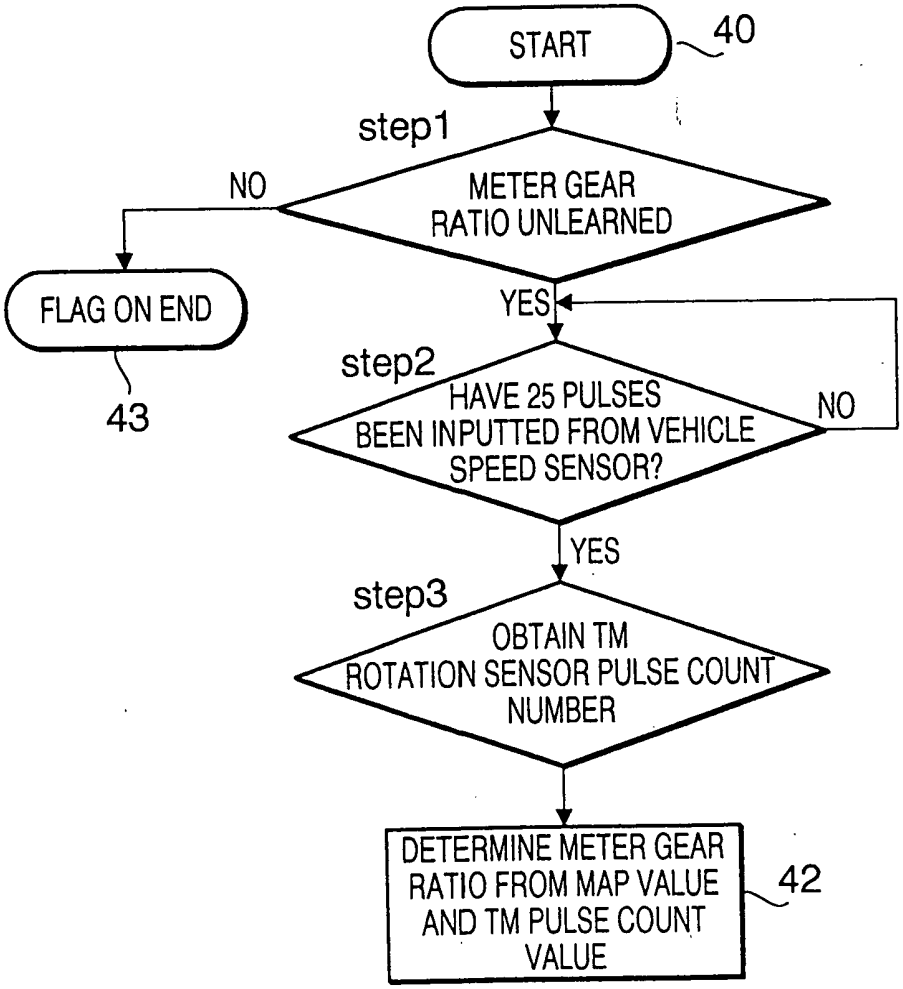

START
40
step1
METER GEAR RATIO UNLEARNED
NO
FLAG ON END
43
YES
step2
HAVE 25 PULSES BEEN INPUTTED FROM VEHICLE SPEED SENSOR?
NO
YES
step3
OBTAIN TM ROTATION SENSOR PULSE COUNT NUMBER
DETERMINE METER GEAR RATIO FROM MAP VALUE AND TM PULSE COUNT VALUE
42

FIG.20

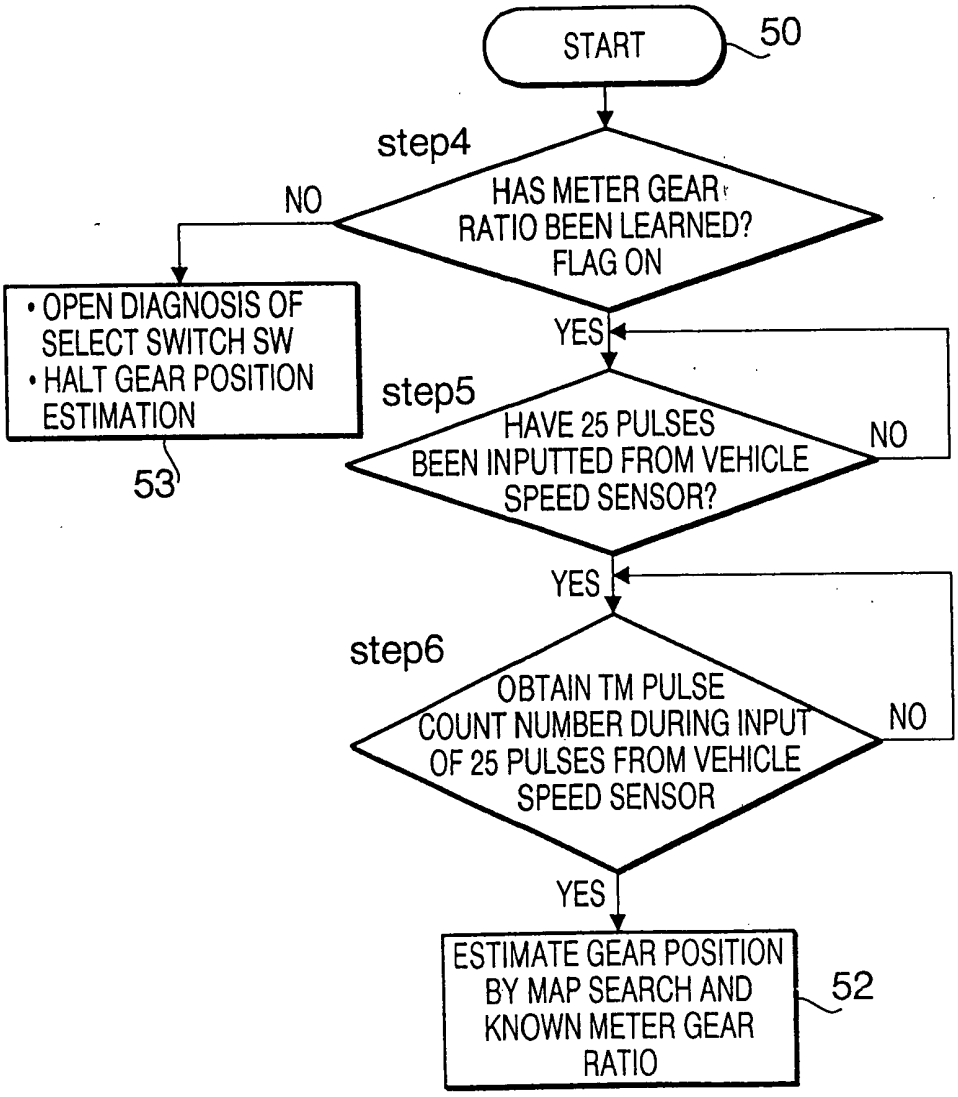

START
50
step4
HAS METER GEAR RATIO BEEN LEARNED? FLAG ON
NO
YES
• OPEN DIAGNOSIS OF SELECT SWITCH SW
• HALT GEAR POSITION ESTIMATION
53
step5
HAVE 25 PULSES BEEN INPUTTED FROM VEHICLE SPEED SENSOR?
NO
YES
step6
OBTAIN TM PULSE COUNT NUMBER DURING INPUT OF 25 PULSES FROM VEHICLE SPEED SENSOR
NO
YES
ESTIMATE GEAR POSITION BY MAP SEARCH AND KNOWN METER GEAR RATIO
52

FIG.21

| Z / TM TYPE | Dri(5th) | | 4th | | 3rd | | 2nd | | 1st | | Rev | | 6th | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | C | M | C | M | C | M | C | M | C | M | C | M | C |
| C TYPE | ZM5 | ZC5 | ZM4 | ZC4 | ZM3 | ZMC | ZM2 | ZC2 | ZM1 | ZC1 | ZMR | ZCR | ZM6 | ZC6 |
| D TYPE | ZM5 | ZC5 | ZM4 | ZC4 | ZM3' | ZC3' | ZM2 | ZC2 | ZM1 | ZC1 | ZMR | ZC5 | ZM6' | ZC6' |

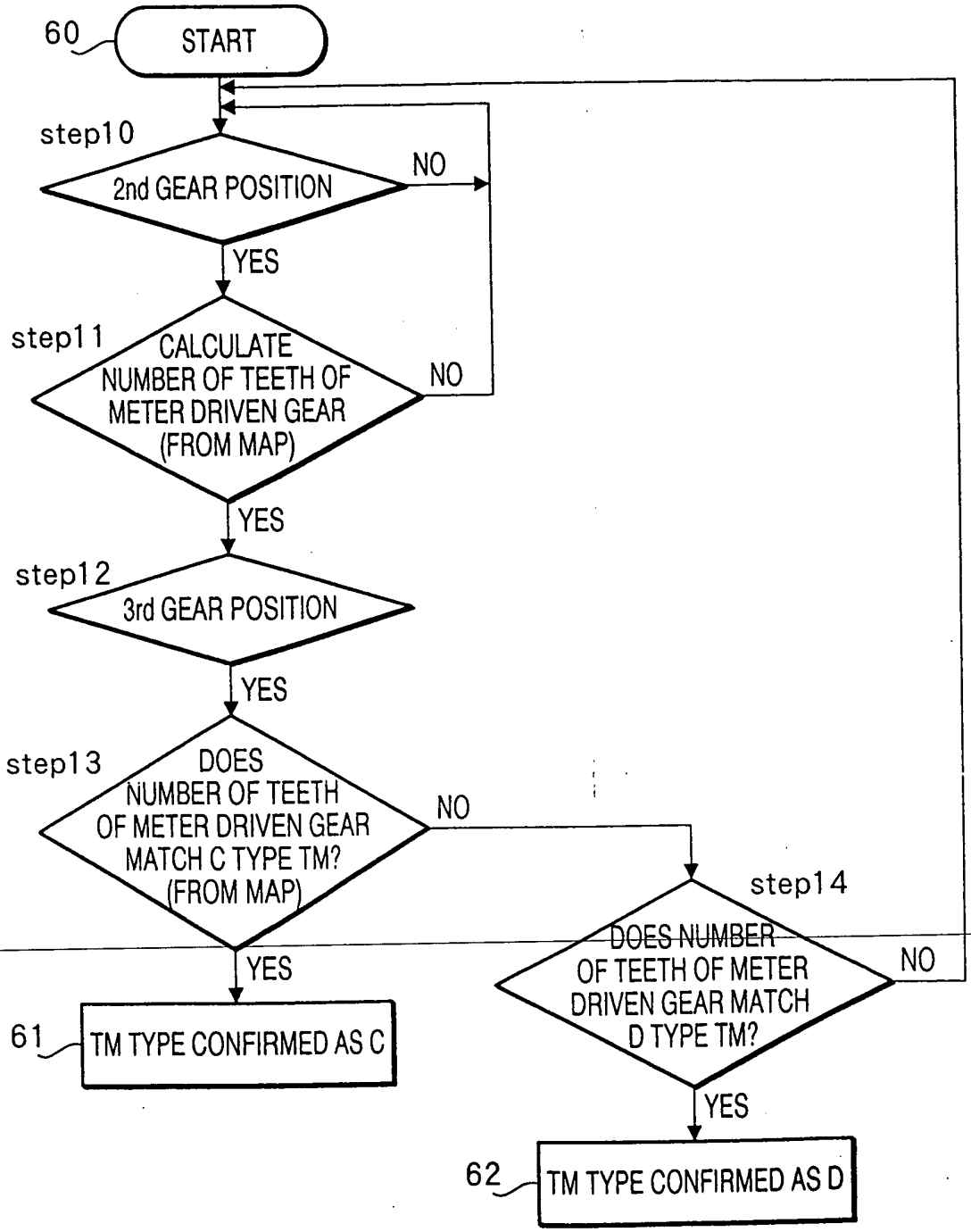



FIG.22